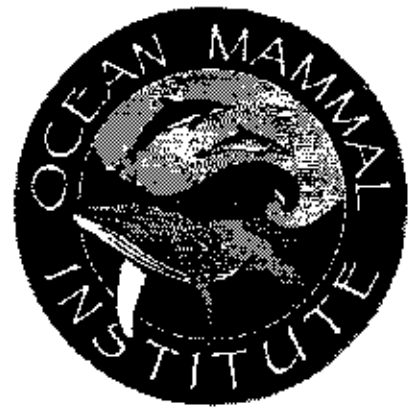

OCEAN MAMMAL INSTITUTE

May 30, 2001

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Donna Weiting
Marine Mammal Conservation Division
Office of Protected Resources
National Marine Fisheries Service
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Dear Ms. Weiting,

I am writing to comment on the proposed rulemaking for the US Navy's SURTASS LFA sonar system. I do research on the effects of boat traffic and engine noise on whales. In a five-year report I submitted to NMFS in March 1998, I discussed my findings that when a boat's engine reaches a received level of 120dB re 1 µPa whales swim 2 to 3 times faster than they do around quieter boats. This finding corroborates the large body of literature indicating that whales begin to avoid sounds at about 115-120dB (Richardson et al., 1995).

The conclusion in the FEIS that received levels below 180dB are relatively safe for marine mammals deviates from the accepted literature. This conclusion is not supported by empirical data but is based on extrapolation above 155dB. In Appendix D of the FEIS (pD-1) the Navy acknowledges "the lack of empirical data in the received level range of 155-180dB is an issue."

Empirical Evidence and Risk of Injury

While the Navy spent millions of dollars on a scientific research program (SRP) to test the effects of LFAS on whales, their research gives us no empirical evidence about the effects of received levels above 155dB. Scientists hired by the Navy to do the testing caution in the Executive Summary of the Hawaii Quicklook that "it will be difficult to extrapolate from these tests [with received levels below 155dB and usually below 140dB] to predict responses at higher

exposure levels." They make a similar statement on p. 9 in the Quicklook on gray whales off California – Phase II. Unfortunately, the Navy has not heeded the advice of the scientists they hired to execute the SRP and has extrapolated in the FEIS to conclude that there is not significant risk at received levels below 180dB.

Most likely the reason no monitoring program is proposed for animals who will be exposed to 155-180dB (or below 155dB) is because it is not possible to visibly monitor at the distances over which those sounds will be received. The fact that there is no monitoring program between 155-180dB, where we also have no empirical data on effects, is a significant problem that remains unaddressed in the FEIS.

The FEIS states that "For injury, an animal would have to be within the 180dB sound field at the onset of a transmission" (p. ES 14). The implication is that there will be no injury when exposed to lower decibel levels. This is an assumption, not an observation based on empirical knowledge. In fact, evidence from mass strandings in Greece and the Bahamas indicates lethal injury by high intensity sonar at received levels below 180dB (Balcomb letter to J. Johnson, February, 2000).

The Navy's request for a "small take" authorization under the Marine Mammal Protection Act (MMPA) is based on their conclusion that below 180dB, LFA sonar will have negligible effects on survival and productivity of marine mammals (that is, have no biologically significant effect). In their letter to Joe Johnson, commenting on the DEIS, (dated October 27, 1999) the Marine Mammal Commission recommended that in order to satisfy the monitoring and reporting requirements of the MMPA, 1) the Navy determine what monitoring "will be required to confirm the validity of the key assumption upon which their negligible effects conclusion is based." (The key assumption is that exposure to LFA sonar at received levels below 180dB presents no risk of having biologically significant effects on any marine mammals.) 2) "the FEIS include descriptions of both the assumptions and the monitoring that will be done to confirm the validity of the assumptions upon which the conclusion is based." It does not appear that the FEIS includes significant plans to monitor anything much beyond 2km and it is difficult to visually monitor as far as 2km away.

Mass Strandings

While we have no empirical data on effects from received levels of LFA sonar between 155-180dB from the SRP, we do have correlational evidence from two mass strandings which suggests that exposure to received levels of high intensity sonar below 180dB may be lethal to whales and dolphins. In the Mediterranean stranding in 1996 (Frantzis in Nature, 1998) the 1st whale to strand must have been at least 25 km from the ship when the low frequency sonar test began (Balcomb letter to J. Johnson, February 23, 2000). In Annex G of the NATO

report on this stranding the Navy calculated the received level at that distance to be about 150 dB. Frequencies used during this stranding do overlap the Navy's LFA frequencies (p. 3.2 – 45, FEIS). In the Bahamas stranding in March 2000, the stranding area was too large and there were not enough ships to expose all the stranded whales to received levels above 180 dB. Therefore the evidence we do have indicates that lethal strandings could occur at received levels of less than 180dB and these areas should be carefully monitored if LFA were deployed.

Since the Navy has no empirical evidence for effects between 155-180dB it would be prudent to pay particular attention to these two mass strandings which occurred during high intensity sonar transmissions. In fact, 7 out of 7 mixed species strandings including beaked whales occurred while naval maneuvers were being conducted nearby. While correlation cannot prove causation it can give evidence for causation. Seven out of seven is compelling evidence suggesting causative linkage. Although mid-frequency sonar was used during the Bahama stranding rather than LFA sonar, many scientists believe LFA sonar is more likely to be harmful because it covers greater distances and, therefore, exposes more animals and it has longer pings. Also the cranial air space resonance of beaked whales is known to be in about the center of the LFA sweep so resonance effects are a reasonable expectation.

We also know about the stranding of 4 beaked whales on the same day, on 3 different Caribbean Islands in October 1999. This stranding was correlated with a loud sound in the water that made humans doing coral reef research get their heads out of the water. The stranding followed the usual pattern of beaked whales beaching over a large area. Dr. Antonio Mignucci, Oceanography Professor at San Juan's Universidad Metropolitana, said he conducted necropsies and sent samples to the NMFS laboratory in Miami. This well-documented stranding has passed into relative obscurity and is not mentioned in the FEIS. I have been told that the tissue samples were not preserved properly so lab analysis could not be done. That is unfortunate, but why isn't there an investigative report on this stranding that we know was correlated with loud underwater sound? Were there naval maneuvers in the area at the time?

Underestimation of Risk

I am concerned about the graph in Chapter 4 (p 4.2-24). The Y axis is labeled "Risk of Significant Change in Biologically Important Behavior." It indicates a 2.5% risk for significant change in biologically important behavior at 150dB. In view of the body of literature indicating that whales begin to avoid sounds at about 115-120dB, and in view of the SRP results showing inshore gray whales changing their migration route during LFA test periods at received levels of about 140dB, and in view of the lethal stranding in Greece at received levels of about 150dB, it appears that this graph underestimates the decibel level of risk for change in biologically important behavior.

In addition, the fact that blue and fin whales decreased their vocalizations by 50% and 30% respectively during SRP tests could be a biologically significant change since these calls may be used for mating. However, it has been dismissed as biologically insignificant. Since we have no long term data on changes in reproductive rates or other long term behavior from the SRP, we really don't know whether such decreases in vocalization by blue and fin whales, or whether the significant increases in the length of humpback whale songs at received levels usually below 140dB observed during the Hawaii SRP (Miller et al., Nature, 2000), constitute significant changes in biologically important behavior. To indicate only a 2.5% risk of significant behavioral change at RL's of 150dB seems unrealistic given the above-mentioned data. Also to reiterate an earlier point, this graph and the above changes in whale behavior documented during the SRP, indicate the possibility of change in biologically significant behaviors occurring at received levels well below 180dB and any such changes should be monitored and reported according to the MMPA.

Nonauditory Effects

The Navy has concentrated their discussion about the effects of LFAS on potential damage to hearing and auditory organs in cetaceans. However, acoustic energy also has nonauditory effects on marine mammals. Necropsies on the whales that stranded in the Bahamas in March, 2000 strongly suggest that resonance phenomena in the whales' cranial air spaces resulted in the observed tissue tearing and hemorrhaging around their inner ears and brains. NATO and the US Naval Undersea Warfare Center had calculated the resonance frequency of airspaces in beaked whales in 1998 and found it to be in the LFAS range. (pH2, SACLANTCEN M-133).

In the FEIS, the Navy has a paragraph on possible resonance effects on the swim bladders of fish. I cannot find any discussion of possible resonance effects in cetaceans in the main body of the EIS even though they have cranial air spaces and lungs, which would be susceptible to such effects. Necropsy evidence from the Bahama stranding suggests that the issue of deadly resonance effects from high intensity sonars should be thoroughly considered. The fact that resonance effects are not mentioned relative to marine mammals in the FEIS is surprising in view of the SACLANTCEN report. The fact that mid-frequency sonar caused air bubble resonance effects in the Bahamas makes me even more concerned about these effects with LFA sonar (since the cranial air space resonance of beaked whales is calculated to be 290 Hz at 500m deep, which is in about the center of the LFA sweep) and permission to deploy should be contingent on a thorough investigation of resonance phenomena in marine mammals and other relevant species. In fact the recent report of the National Research Council on "Marine Mammals and Low Frequency Sound: Progress Since 1994" says we need research to determine any nonauditory effects of low frequency sound on marine mammals.

Other Effects

We do know that of the 35 beaked whales previously photo-identified in the Bahamas by Ken Balcomb, none have been sighted since that stranding. The fact that Mr. Balcomb has not seen any of these previously identified whales during the past year indicates that the naval exercise last March may have killed all those whales, not just one or two individuals. This is not a negligible impact. Mr. Balcomb has seen only two beaked whales since the stranding in March 2000 and they were individuals not sighted previously so were probably newcomers to the area. To see only 2 beaked whales in a year in the Bahamas is highly unusual.

Other Species

In their recent report entitled "Marine Mammals and Low Frequency Sound: Progress Since 1994", the National Research Council expresses concern about the potential effects of low frequency sound on the marine mammal food chain including zooplankton, fish and other endangered species such as turtles. They noted there's been almost no attempt to study effects on fish. If the food chain is affected it will obviously affect marine mammals. What is the effect of LFA sonar on essential fish habitat (EFH)? In their comments on the DEIS, Donald Knowles, Director of NMFS' Office of Protected Resources and Andrew Kemmerer, Director of NMFS' Office of Habitat Conservation state that the DEIS "does not analyze the impact of the proposed activity on essential fish habitat (EFH) of marine fishery species and that the NMFS was not able to determine whether the proposed activity would adversely affect EFH." They recommended that the Navy either initiate consultation with NMFS or explain in the FEIS the basis for a conclusion that the proposed activity would not affect EFH. As with marine mammals, the Navy's conclusions of nonsignificant impacts on fish and their habitats are based on a number of assumptions and not on empirical evidence.

Observations of sea otters made near the playback site during SRP tests off California in January, 1998 found that sea otter foraging success was reduced by 11% and dive time increased by about 11% when the LFA sound source was on (Quicklook, Phase II). This decrease in food-getting efficiency and increase in dive time could have biologically significant effects on a population.

Conclusions

The Navy's scientific research program studied the effects of low frequency sound on only 4 species of whales for 1 month each. The National Research Council Report concludes on p.52 that critical exposure levels cannot be extrapolated from a few species. Unfortunately, this is what the EIS does; it extrapolates from low level testing done on 4 species to conclude that much higher deployment levels are safe for all cetaceans.

The National Research Council also concludes that "Developing an understanding of the effects of low frequency sound on marine mammals will require a more sustained and integrated approach than has been the case in previous research." They conclude in the Executive Summary of their Report by saying, "Our understanding of how marine mammals react to natural and human-made sound is rudimentary." That merely rudimentary level of knowledge is why 26 members of Congress wrote to the Secretary of Defense, Wm. Cohen on July 19, 2000 and asked him to postpone proceeding with LFAS because there was not enough scientific evidence to show that it is safe.

I am suggesting that NMFS deny the Navy's request for a Letter of Authorization to deploy LFAS because there is not enough scientific evidence to conclude that it is safe (only 4 species were tested for one month each at levels below the planned deployment), because the proposed monitoring program is not adequate and because the evidence we do have, from two mass strandings, indicates that both low frequency active sonar and mid-range sonar may have lethal nonauditory effects on whales & dolphins at received levels lower than 180 dB. In addition, the FEIS does not discuss possible safe, passive alternatives for monitoring quiet submarines such as the Advanced Deployable System discussed by Rear Admiral Fages in June, 2000 before a Congressional subcommittee and the Robust Passive Sonar Program which was briefed to the Department of Defense on September 6-8, 2000 by Dr. Thomas J. Green of DARPA. On p. 1 in the FEIS the Navy cites the National Research Council's projection that by 2035, the US may be "seriously and competently challenged by submarines from major powers." Why deploy LFA sonar *now*, which is potentially dangerous to marine life, when we have years to develop submarine defense systems that are safe?

Sincerely,

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